What is claimed is:

1. A thin-film bulk acoustic oscillator comprising:

a piezoelectric thin film that exhibits a piezoelectric property;

a first electrode and a second electrode that are disposed on both surfaces of the piezoelectric thin film and apply an excitation voltage to the piezoelectric thin film; and

a base; wherein:

the first electrode, the piezoelectric thin film and the second electrode are stacked in this order on the base; and

a surface of the piezoelectric thin film close to the second electrode has a root mean square roughness of 2 nanometers or smaller.

2. The thin-film bulk acoustic oscillator according to claim 1, wherein the piezoelectric thin film is made of zinc oxide or aluminum nitride.

3. A method of manufacturing a thin-film bulk acoustic oscillator comprising: a piezoelectric thin film that exhibits a piezoelectric property; a first electrode and a second electrode that are disposed on both surfaces of the piezoelectric thin film and apply an excitation voltage to the piezoelectric thin film; and a base; wherein the first electrode, the piezoelectric thin film and the second electrode are stacked in this order on the base, the method comprising the steps of:

forming the first electrode on the base;

forming the piezoelectric thin film on the first electrode;

polishing a top surface of the piezoelectric thin film; and

forming the second electrode on the top surface of the piezoelectric thin

film polished.

4. The method according to claim 3, wherein the top surface of the piezoelectric thin film is polished to have a root mean square roughness of 2 nanometers or smaller in the step of polishing.

5. The method according to claim 3, wherein the top surface of the piezoelectric thin film is polished by chemical mechanical polishing in the step of polishing.

6. The method according to claim 3, wherein the piezoelectric thin film is made of zinc oxide or aluminum nitride.